1. A system for sorting multicellular organisms comprising:

a population of multicellular organisms comprising a plurality of spatially distinct, optically detectable, phenotypic characteristics; and

an instrument for detecting the location of the spatially distinct, optically detectable, phenotypic characteristic on the multicellular organism and for orienting the worm along its longitudinal axis.

2. The system of claim 1, wherein the spatially distinct, optically detectable, phenotypic characteristics comprise a marker pattern comprising a plurality of spatially consistent first features spaced apart along a length of each organism and at least one second feature modifiable or inducible when the population is subjected to a test treatment.

3. The system of claim 1, wherein the instrument is a flow cytometer equipped to process elongate multicellular organisms.

4. The method of claim 1, wherein the instrument measures a gating signal for detecting the spatially distinct, optically detectable, phenotypic characteristic over background signals.

5. The system of claim 4, wherein the gating signal gating signal comprises light scattered in the forward direction.

6. The process of claim 4, wherein the gating signal comprises light attenuated by the organism in the forward direction.

7. The system of claim 1, wherein the instrument further comprises:

a source containing multicellular organisms in a fluid suspension;

means for causing the fluid suspension to move in a direction of flow;

means for aligning the elongate multicellular organisms relative to the direction of flow;

a light source for producing an optical beam through which the elongate multicellular organisms pass after becoming aligned;

a first optical detector for detecting light over a solid angle of at least 20 degrees and over a collection angle of approximately 0.0 to 6.0 degrees in the horizontal axis and approximately 17 degrees in the vertical axis, for detecting passage of said organisms through said optical beam; and

a fluid switch downstream of a point where said organisms pass through said optical beam, said switch responsive to the first optical detector to allow detected objects to pass to a sample container.

8. The system of claim 7, further comprising additional optical detectors for detecting sequential optical characteristics arrayed along a length of the multicellular organism wherein outputs of said detectors are gated by an output of the first optical detector to produce gated outputs.

9. The system of claim 8, further comprising a data representation of the sequential optical characteristics comprised of the outputs of the additional optical detectors.

10. The system of claim 9, further comprising a controller connected to the fluid switch and operative to cause said switch to select multicellular organisms showing data representations meeting predetermined criteria.

11. A method for sorting multicellular organisms comprising the steps of:

providing a population of test organisms, wherein each member of the population displays at least one spatially distinct, optically detectable, phenotypic characteristic;

analyzing the arrangement of spatially distinct, optically detectable, phenotypic characteristics of each population member; and

depositing members of the population based on the arrangement of spatially distinct, optically detectable, phenotypic characteristics.

12. The method of claim 11, wherein the spatially distinct, optically detectable, phenotypic characteristics comprise a marker pattern comprising a plurality of spatially consistent first features spaced apart along a length of each organism and at least one second feature modifiable or inducible when the population is subjected to a test treatment.

13. The method of claim 12, wherein the organisms are selected based on the location of the second feature with respect to the first features along the length of each organism.

14. The method of claim 12, wherein the organisms are deposited based on the location of the second feature with respect to the first features along the length of each organism.

15. An instrument for analyzing and selectively dispensing elongate multicellular organisms comprising:

a source containing multicellular organisms in a fluid suspension;

means for causing the fluid suspension to move in a direction of flow;

means for aligning the elongate multicellular organisms relative to the direction of flow;

a light source for producing an optical beam through which the elongate multicellular organisms pass after becoming aligned;

a first optical detector for detecting light over a solid angle of at least 20 degrees and over a collection angle of approximately 0.0 to 6.0 degrees in the horizontal axis and approximately 17 degrees in the vertical axis for detecting passage of said organisms through said optical beam; and

a fluid switch downstream of a point where said organisms pass through said optical beam, said switch responsive to the first optical detector to allow detected objects to pass to a sample container.

16. The instrument of claim 15, further comprising additional optical detectors for detecting sequential optical characteristics arrayed along a length of the multicellular organism wherein outputs of said detectors are gated by an output of the first optical detector to produce gated outputs.

17. The instrument of claim 16, further comprising a data representation of the sequential optical characteristics comprised of the outputs of the additional optical detectors.

18. The instrument of claim 17, further comprising a controller connected to the fluid switch and operative to cause said switch to select multicellular organisms showing data representations meeting predetermined criteria.

19. A method of selectively dispensing elongate multicellular organisms comprising the steps of:

centering and orienting the sample objects in a flowing fluid stream;

passing the fluid stream through a sensing zone;

optically detecting the presence of a multicellular organism passing through the sensing zone by means of a light scatter sensor that has an acceptance angle of at least 20

degrees and over a collection angle of approximately 0.0 to 6.0 degrees in the horizontal axis and approximately 17 degrees in the vertical axis;

creating a data representation of sequential optical characteristics of the multicellular organism comprising output signals from additional optical sensors;

diverting at least some portion of the fluid stream with a switched fluid stream based on the data representation so as to collect ones of the multicellular organisms remaining in portions of the sample stream that were not diverted.

20. The method of claim 19, further comprising the step of exposing the multicellular organisms collected in the step of diverting to a test chemical or test environment.

21. The method of claim 19 further comprising the step of exposing the multicellular organisms to a test chemical or a test environment prior to the detecting step to determine whether the data representation is altered by the test chemical or the test environment.

22. A data structure representative of an oriented elongate multicellular organism containing indicia of sequential optical characteristics disposed along a length of said organism, said data structure comprised of stored sequential outputs derived from optical sensors arranged to receive optical energy emanating from the elongate multicellular organism as said organism passes through an optical beam wherein a signal from a light scatter sensor that has an acceptance angle of at least 20 degrees and over a collection angle of approximately 0.0 to 6.0 degrees in the horizontal axis and approximately 17 degrees in the vertical axis is used to create or utilize the data structure.

23. A process for analyzing elongate multicellular organisms by flow cytometry comprising the steps of:

creating a population of test organisms wherein each member of the population displays a marker pattern, said marker pattern representing a plurality of spatially

consistent first features spaced apart along a length of each organism and wherein each member of the population also displays at least one of a second feature modifiable or inducible when the population is subjected to a test treatment, each of said first and said second features being detectable through analysis with a flow cytometer;

subjecting the population to a test treatment;

analyzing members of the population with a flow cytometer equipped to process elongate multicellular organisms; detecting the marker pattern on the members analyzed; and

using the detected marker pattern to determine status of the second feature on each of the members analyzed.

24. The process according to claim 23, wherein the step of creating a population includes the step of producing a transgenic organism.

25. The process according to claim 24, wherein the step of producing a transgenic organism includes choice of a particular promoter.

26. The process according to claim 23, wherein the marker pattern is detectable by a flow cytometer by use of detection means selected from the group consisting of light scatter, light absorption and fluorescence.

27. The process according to claim 23, wherein the step of subjecting the population to a test treatment includes contacting the population with a candidate drug molecule.

28. The process according to claim 23, wherein the second feature responds to the test treatment by a change detected as an optical signal, the change being one selected from

the group consisting of an increased signal, a decreased signal or a positionally altered signal.

29. The process according to claim 23, wherein the step of using the detected marker pattern includes the step of determining a longitudinal orientation of each member of the population analyzed.

30. The process according to claim 23, wherein the step of using the detected marker pattern includes the step of limiting analysis of data corresponding to the second feature to a particular longitudinal region of each of the members analyzed.

31. The process according to claim 23, wherein the step of using the detected marker pattern includes the step of altering a mode data analysis for data corresponding to the second feature in a particular longitudinal region of each of the members analyzed.

32. The process according to claim 31, wherein the mode of data analysis is selected from the group consisting of signal peak analysis and signal integration.

33. The process of claim 23, wherein the step of analyzing members of the population with a flow cytometer comprises selecting a gating signal.

34. The process of claim 33, wherein the gating signal comprises light scattered in the forward direction.

35. The process of claim 33, wherein the gating signal comprises light attenuated by the organism in the forward direction.

36. A process for preparing a model strain of elongate multicellular organisms intended for specialized flow cytometry analysis comprising the steps of:

creating a marker strain of organisms wherein each member of the strain displays a marker pattern, said marker pattern representing a plurality of marker features spaced apart along a length of each organism and spatially consistent from member to member, said marker features being detectable through analysis with a flow cytometer;

creating a test strain of organisms wherein each organism of the test strain displays at least one test feature modifiable or inducible when the test strain is subjected to a test treatment, said test features being detectable through analysis with a flow cytometer; and

creating a model strain by combining the marker pattern from the marker strain with the test features from the test strain so that each organism of the model strain displays both the marker pattern and at least one test feature.

37. An organism belonging to a model strain produced by the process of claim 36.

38. A process for analyzing elongate multicellular organisms by flow cytometry comprising the steps of:

subjecting a population of the model strain of claim 36 to a test treatment;

analyzing members of the subjected population with a flow cytometer equipped to process elongate multicellular organisms;

detecting the marker pattern on the members analyzed; and

using the detected marker pattern to determine status of the test feature on each of the members analyzed.

39. The process according to claim 36, wherein the step of creating a population includes the step of producing a transgenic organism.

40. The process according to claim 36, wherein the step of producing a transgenic organism includes choice of a particular promoter.

41. The process according to claim 38, wherein the marker pattern is detectable by a flow cytometer by use of detection means selected from the group consisting of light scatter, light absorption and fluorescence.

42. The process according to claim 38, wherein the step of subjecting the population to a test treatment includes contacting the population with a candidate drug molecule.

43. The process according to claim 38, wherein the test feature responds to the test treatment by a change detected as an optical signal, the change being one selected from the group consisting of an increased signal, a decreased signal or a positionally altered signal.

44. The process according to claim 38, wherein the step of using the detected marker pattern includes the step of determining a longitudinal orientation of each member of the

population analyzed.

45. The process according to claim 38, wherein the step of using the detected marker pattern includes the step of limiting analysis of data corresponding to the second feature to a particular longitudinal region of each of the members analyzed.

46. The process according to claim 38, wherein the step of using the detected marker pattern includes the step of altering a mode data analysis for data corresponding to the second feature in a particular longitudinal region of each of the members analyzed.

47. The process according to claim 46, wherein the mode of data analysis is selected from the group consisting of signal peak analysis and signal integration.